

# Miniature Pencil-Beam X-ray Collimator

Completed Technology Project (2016 - 2017)



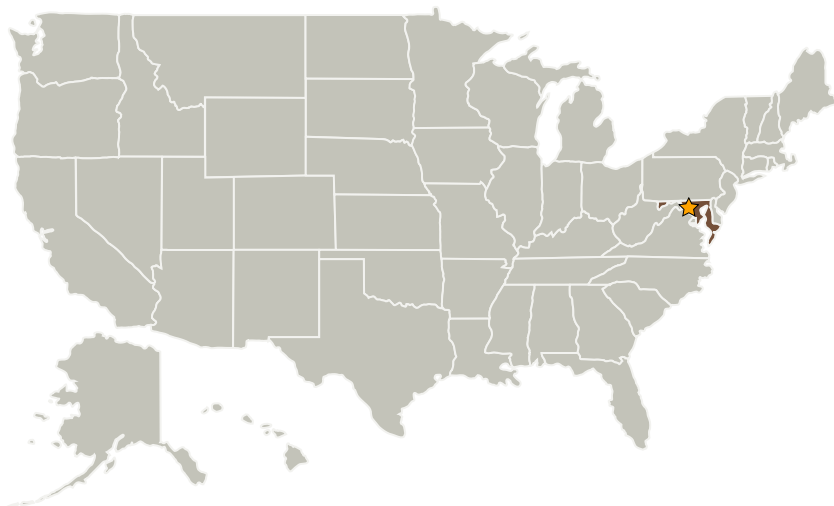
## Project Introduction

X-ray mirrors used on current astrophysical satellites have sub-arcmin angular resolution and a physical diameter about tens of cm. This poses a serious practical problem for their calibration, which requires a parallel incident X-ray beam to approximate a celestial point source at infinite distance.

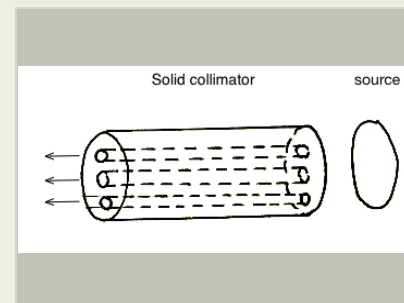
## Anticipated Benefits

Our 1' beam will be narrower than that achieved in the 100-m long X-ray beamline. In general, such a narrow-beam source would enable a much more practical end-to-end ground testing of future X-ray instruments, because the calibration source could be placed right next to the telescope, and therefore testing does not have to be done in the vacuum, i.e. a spacecraft end-to-end test (since X-rays of a few-keV energy can pass a few meters in the air). Such pencil-beam calibration sources would be cheap and easily manufactured with a design tailored to each particular mission as part of their hardware budget.

## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Goddard Space Flight Center (GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland



Proposed miniature collimator concept

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## Primary U.S. Work Locations

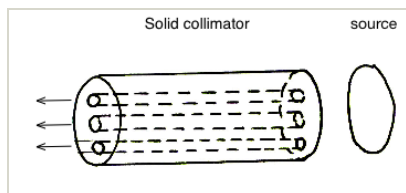
Maryland

## Project Transitions

**October 2016:** Project Start**September 2017:** Closed out

**Closeout Summary:** The purpose of the Goddard Space Flight Center's Internal Research and Development (IRAD) program is to support new technology development and to address scientific challenges. Each year, Principal Investigators (PIs) submit IRAD proposals and compete for funding for their development projects. Goddard's IRAD program supports eight Lines of Business: Astrophysics; Communications and Navigation; Cross-Cutting Technology and Capabilities; Earth Science; Heliophysics; Planetary Science; Science Small Satellites Technology; and Suborbital Platforms and Range Services. Task progress is evaluated twice a year at the Mid-term IRAD review and the end of the year. When the funding period has ended, the PIs compete again for IRAD funding or seek new sources of development and research funding or agree to external partnerships and collaborations. In some cases, when the development work has reached the appropriate Technology Readiness Level (TRL) level, the product is integrated into an actual NASA mission or used to support other government agencies. The technology may also be licensed out to the industry. The completion of a project does not necessarily indicate that the development work has stopped. The work could potentially continue in the future as a follow-on IRAD; or used in collaboration or partnership with Academia, Industry and other Government Agencies. If you are interested in partnering with NASA, see the TechPort Partnerships documentation available on the TechPort Help tab. <http://techport.nasa.gov/help>

## Images



## Untitled Image 1

Proposed miniature collimator concept

(<https://techport.nasa.gov/image/27785>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Mission Support Directorate (MSD)

**Lead Center / Facility:**

Goddard Space Flight Center (GSFC)

**Responsible Program:**

Center Independent Research & Development: GSFC IRAD

## Project Management

**Program Manager:**

Peter M Hughes

**Project Managers:**

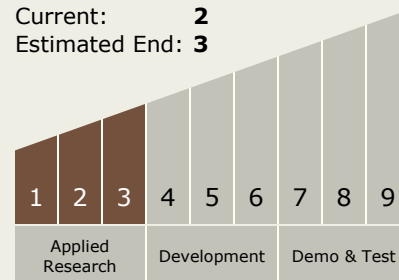
Megan E Eckart  
Timothy D Beach

**Principal Investigator:**

Takashi Okajima

## Technology Maturity (TRL)

Start: **1**  
Current: **2**  
Estimated End: **3**



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### Project Website:

<http://sciences.gsfc.nasa.gov/sed/>

### Technology Areas

#### Primary:

- TX08 Sensors and Instruments
  - └ TX08.1 Remote Sensing Instruments/Sensors
    - └ TX08.1.3 Optical Components

### Target Destination

Outside the Solar System